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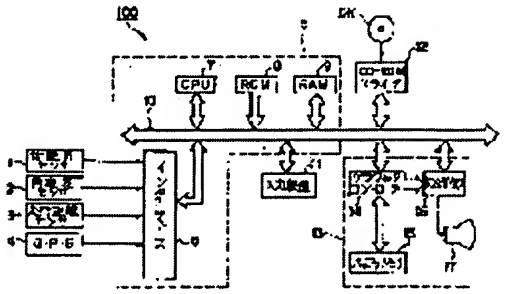
(54) MAP DISPLAY DEVICE

(57)Abstract:

PROBLEM TO BE SOLVED: To numerically display the coordinates of an optional position of a displayed map by finding the latitude and the longitude corresponding to an optionally indicated position on the display map, and displaying the obtained latitude and longitude on the displayed map.

SOLUTION: A system controller 5 computes the longitude and the latitude of a display position based on the position of a position indicating cursor. Based on the longitude and the latitude of the obtained display position, the map data of the display position are read from CD-ROM disk DK into a buffer memory 15 through a bus line 10 and a CD-ROM drive 12. Simultaneously with this, a graphic controller 14 draws the map nearby the display position on the display screen of a display 17, based on the control data from a CPU 7. Next the system controller 5 further superscribes the longitude and the latitude of the obtained display position on the screen by letters (numerical values). Hereby, even at an unfamiliar place, a destination can be correctly transmitted to a partner, and the mutual positional relation can be immediately grasped.



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[Date of requesting appeal against examiner's decision of rejection]

[Date of extinction of right]

* NOTICES *

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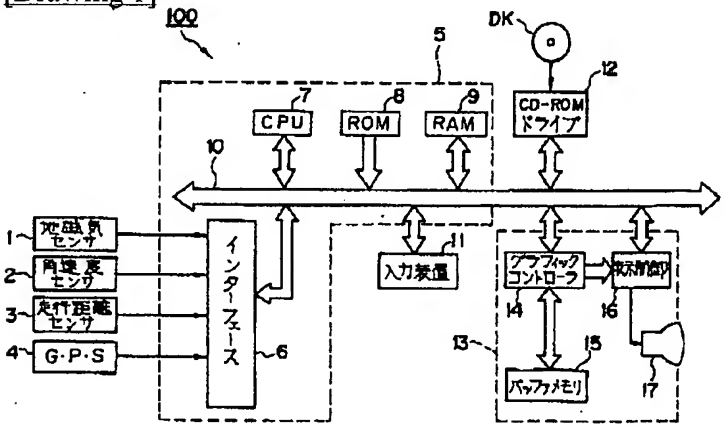
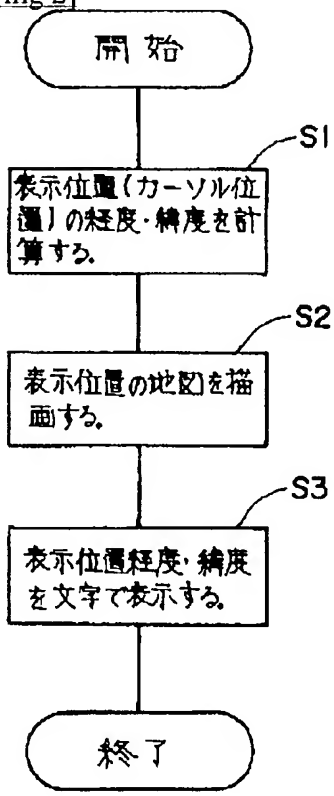
DRAWINGS

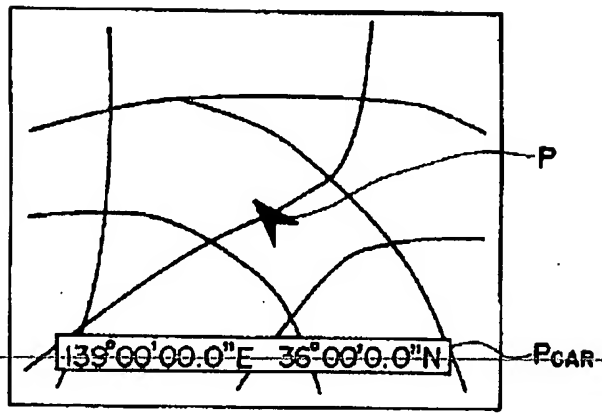
[Drawing 1]



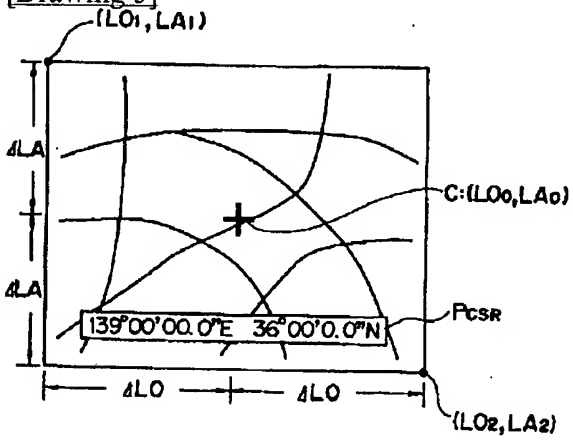
[Drawing 2]



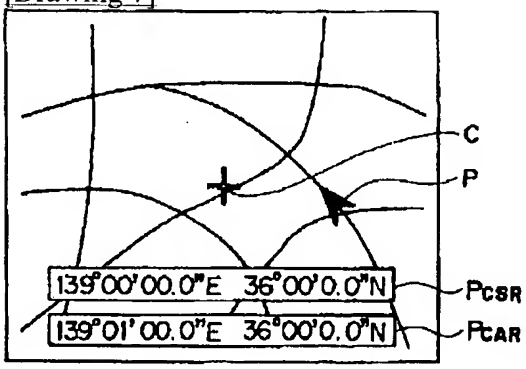
[Drawing 4]



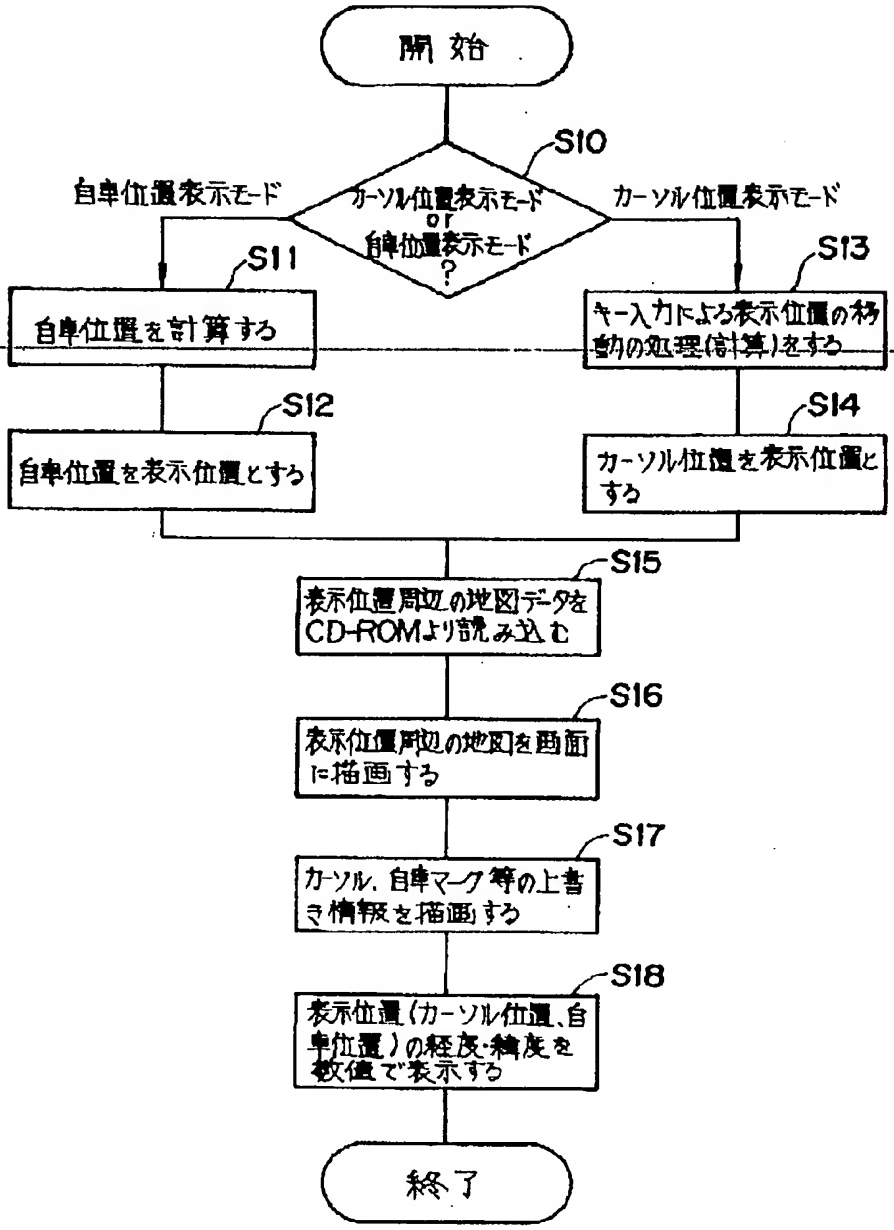
[Drawing 5]



[Drawing 7]

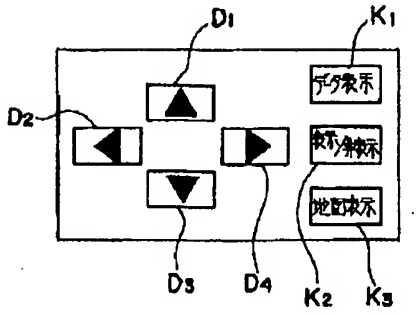


[Drawing 3]

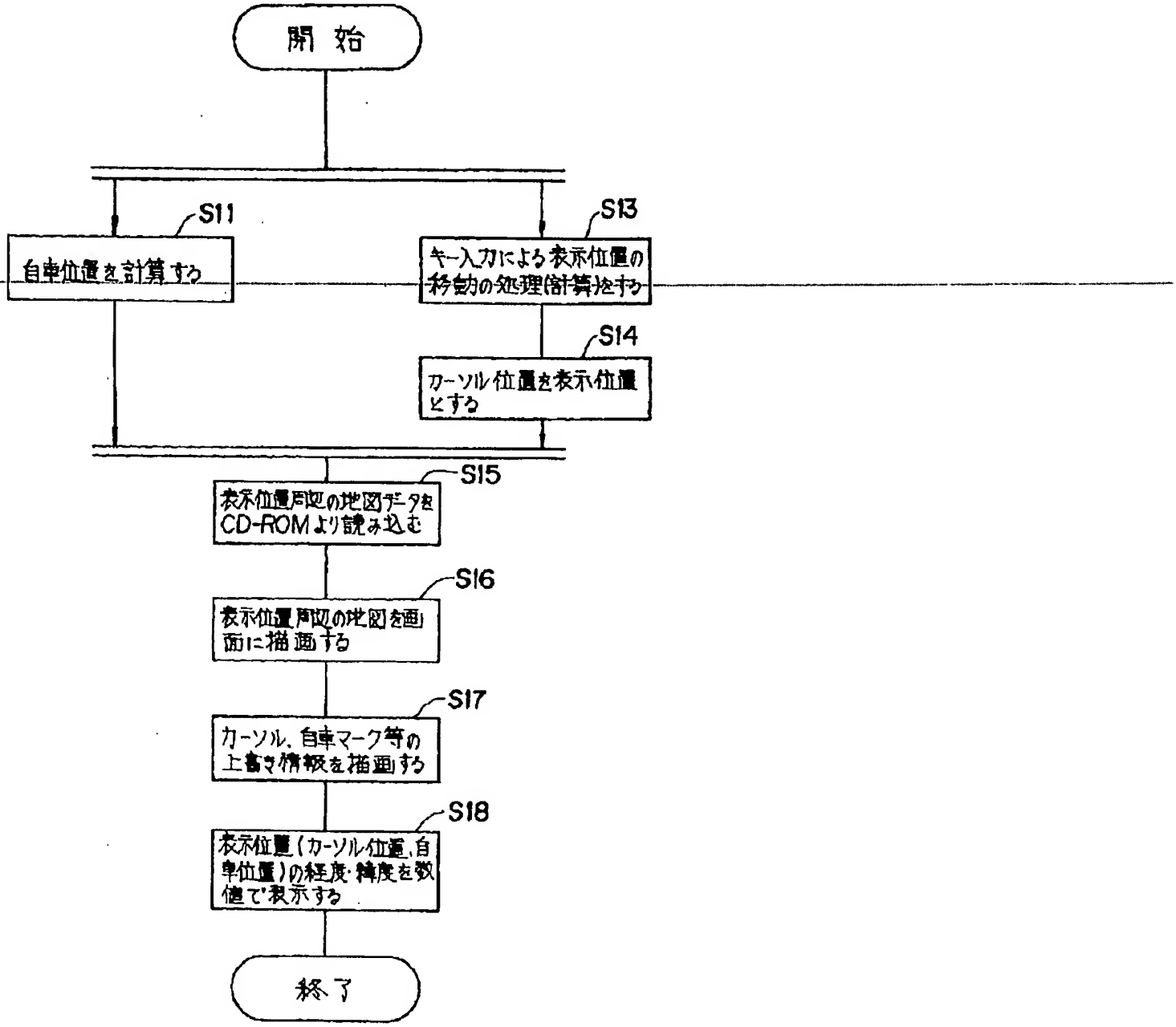


[Drawing 8]

11：コマンダ(入力装置)



[Drawing 6]



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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is the block diagram showing the outline configuration of navigation equipment.
[Drawing 2] It is the processing flow chart which shows outline actuation of navigation equipment.
[Drawing 3] It is the detail processing flow chart (1) of a position-coordinate display process.
[Drawing 4] It is an example explanatory view of a display at the time of self-vehicle position representation mode.
[Drawing 5] It is an example explanatory view of a display at the time of a cursor location display mode.
[Drawing 6] It is the detail processing flow chart (2) of a position-coordinate display process.
[Drawing 7] It is an example explanatory view of a display at the time of a mixed mode.
[Drawing 8] It is the explanatory view showing a commander's configuration.
[Description of Notations]
100 -- Navigation equipment
1 -- Earth magnetism sensor
2 -- Angle sensor
3 -- Mileage sensor
4 -- GPS receiver
5 -- System controller
6 -- Interface section
7 -- CPU
8 -- ROM
9 -- RAM
10 -- Bus line
11 -- Input unit (commander)
12 -- CD-ROM drive
13 -- Display unit
14 -- Graphic controller
15 -- Buffer memory
16 -- Display and control section
17 -- Display
C -- Cursor for tab control specification
D1 - D4 -- Direction key
DK--CD-ROM disk
K1 -- Data display mode key
K2 -- A display / non-display key
K3 -- Map display-mode key
P -- Current position mark of a self-vehicle
PCSR -- Cursor location coordinate
PCAR -- Self-vehicle position coordinate

[Translation done.]

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Industrial Application] This invention relates to the map display which reads map data and displays a map.
[0002]
[Description of the Prior Art] Conventionally, there is the so-called independence type of navigation equipment as positioning equipment for various mobiles, such as an automobile, an aircraft, and a vessel. This independence mold navigation equipment asks for two-dimensional displacement (vector quantity) of a mobile from the bearing data from a bearing sensor, and the rate data from a rate sensor, integrates this two-dimensional displacement to a reference point, and asks for the current position. For example, in the case of an automobile, the addition mileage and addition bearing which are obtained from a mileage sensor and a bearing sensor are integrated to an origin/datum, and it is asking for the current position (data). the distance computed from the total pulse number generated by the time the engine speed of a drive shaft and the pulse number generated by the engine-speed sensor attached in the drive shaft are more specifically matched beforehand and it reached [from the reference point] the current position -- distance amendment -- it multiplies by counting, addition mileage is found, and it is asking for addition bearing by integrating bearing obtained by the earth magnetism sensor.
[0003] Moreover, GPS (Global Positioning System) navigation equipment is developed as positioning equipment using a satellite. This GPS navigation equipment usually receives an electric wave from three or more GPS Satellites, and asks for the current position (data) of a receiving point from false distance data including time-of-day offset of the receiver between each GPS Satellite and a receiving point (self-location), and the location data of each GPS Satellite.
[0004] As a mode using these positioning equipments as actual navigation equipment, there is an advanced thing which displays various data, such as distance to a self-location and the destination and passing speed, on the map screen displayed on the screen of CRT (Cathode Ray Tube) from the easy thing which shows the LAT of the current position, and LONG numerically.
[0005] The navigation equipment which displays various data on a CRT screen creates screen data from read-out, the read map data, and the current position data for which it asked from a storage, such as CD-ROM, outputs the map data with which the called-for current position is included to CRT, and performs image display. With this display image, a user can grasp the self current position in relation to a map.
[0006]
[Problem(s) to be Solved by the Invention] However, when the common destination was set up among two or more navigation equipments which exist in the location which could not obtain the position coordinate data (LAT, LONG) of the location of the arbitration on the map display currently displayed on CRT, for example, was left, there was a trouble that it was difficult to transmit correctly against the destination concerned, especially in an unfamiliar location.
[0007] Then, the purpose of this invention is to offer the map display which can display the coordinate of the location of the arbitration on the map screen currently displayed numerically.
[0008]
[Means for Solving the Problem] In order to solve the above-mentioned technical problem, this invention is characterized in the map display which displays a map based on map data by to have a tab-control-specification means specify the location of the arbitration on a display map, a coordinate operation means ask for the LAT and the LONG corresponding to the specified location, and a coordinate display means display called - for the

LAT and the LONG on said display map.
[0009]
[Function] According to this invention, since a position coordinate (LAT and LONG) is numerically displayed on a map display, it becomes possible to transmit correctly against the destination, to grasp mutual relative physical relationship immediately, etc., and a deployment and common-use-izing of position-coordinate data can be attained also in an unfamiliar location.
[0010]
[Example] Next, the example of this invention is explained with reference to drawing 1 thru/or drawing 8 . The block diagram showing the basic configuration at the time of applying this invention to the navigation equipment for mount at drawing 1 is shown.
[0011] The earth magnetism sensor 1 by which the navigation equipment 100 for mount outputs the bearing data of the travelling direction of a self-vehicle, The angular-velocity sensor 2 which detects the angular velocity at the time of rotation of a self-vehicle, and outputs angular-velocity data, The mileage sensor 3 which outputs mileage data by detecting and integrating with the engine speed of a shaft, With the GPS receiver 4 which receives the electric wave from a GPS Satellite and outputs GPS positioning data The system controller 5 which controls the whole navigation equipment based on bearing data, angular-velocity data, mileage data, and GPS positioning data, Various data from the CD-ROM disk DK under the input device 11 for inputting various data, and control of a system controller 5 Read-out and CD-ROM drive 12 to output, It has the display unit 13 which displays various indicative datas, and consists of under control of a system controller 5.
[0012] It has the interface section 6 in which a system controller 5 performs interface actuation with the exterior, CPU7 which controls the system controller 5 whole, ROM (Read Only Memory)8 in which the control program with which a system controller is controlled was stored, and RAM (Random Access Memory)9 which has the nonvolatile memory section which does not illustrate and stores various data possible [writing], and the input device 11, CD-ROM drive 12, and the display unit 13 are connected through the bus line 10. The system controller 5 is functioning here as a position-coordinate operation means, a position-coordinate display-control means, and a display-control means.
[0013] The display unit 13 is equipped with the graphic controller 14 which controls the whole display unit based on the control data from CPU7 sent through a bus line 10, the buffer memory 15 which consists of memory, such as VRAM (Video RAM), and memorizes temporarily the image information in which a real time display is possible, and the display and control section 16 in which the display 17 of a liquid crystal display, CRT, etc. carries out a display control based on the image data outputted from a graphic controller 14, and is constituted.
[0014] Next, actuation of this example is explained with reference to drawing 2 thru/or drawing 8 . The processing flow chart which shows outline actuation of this example to drawing 2 is shown. A system controller 5 first calculates the LONG of the display position on the basis of the location of for example, the cursor for tab control specification, and the LAT (step S1). The LONG range and LAT range which more specifically set the LONG and the LAT of a location of the cursor C for tab control specification to (LO0 and LA0) as shown in drawing 5 , and can be displayed by the scale of the display screen are that of **** uniquely. If the LONG range and LAT range which can be displayed on a screen in a certain scale are set to 2deltaLO and 2deltaLA, respectively the coordinate (LO1 and LA1) of the upper left edge of the display screen, and the coordinate (LO2 and LA2) of a lower right edge -- respectively -- (LO1 and LA1) It becomes =(LO0-deltaLO, LA0+deltaLA) (LO2 and LA2) = (LO0+deltaLO, LA0-deltaLA). What is necessary is just to search for the coordinate which only the include angle concerned made rotate the coordinate searched for the account of a top, when the upper and lower sides (on a drawing) of the display screen of the above correspond in the direction of north and south (i.e., although it is a case with the upper and lower sides of the display screen parallel to circles of longitude when the upper and lower sides of the display screen lean the degree of predetermined angle to circles of longitude (or parallel)).
[0015] Next, based on the LONG of the display position for which it asked, and the LAT, the map data of the display position concerned are read into buffer memory 15 from the CD-ROM disk DK through a bus line 10 and CD-ROM drive 12. A graphic controller 14 draws the map around a display position on the display screen of a display 17 based on the control data from CPU7 to this and coincidence (step S2). Then, a system controller 5 overwrites further the LONG of the display position for which it asked at step S1, and the LAT on a screen in written form (numeric value) (step S3), and ends the drawing processing concerned.

[0016] In advance of detailed explanation of operation, the input unit (commander) 11 used as a tab-control-specification means is first explained with reference to drawing 8 . Commanders 11 are four direction keys D1-D4 for moving the cursor for tab control specification, or a map display on a screen. Data display mode key K1 for changing data display mode Display selection key K2 which chooses a display / un-displaying Map display-mode key K3 which chooses a map display mode It has. [of data]

[0017] In this case, there are the following three modes as data display mode.

1) Self-vehicle position representation mode which displays only the position-coordinate data of a self-vehicle location. 2) Cursor location display mode which displays only the position-coordinate data of the cursor for tab control specification.

[0018] 3) The mixed mode which displays both of the position-coordinate data of a self-vehicle location and the cursor for tab control specification on coincidence. Moreover, there are the following two modes as a map display mode.

[0019] 1) Smoothed scroll mode which displays a map focusing on a self-vehicle or the cursor for tab control specification, and a map scrolls smoothly a moved part of a self-vehicle location or the cursor for tab control specification.

[0020] 2) Page scrolling mode which displays the following map when the map with which a self-vehicle or the cursor for tab control specification is contained is displayed and a self-vehicle location or the cursor for tab control specification comes out of the display map concerned.

[0021] Next, with reference to drawing 3 - drawing 8 , actuation of the navigation equipment of this example is explained for every data display mode. In the following explanation, the case where smoothed scroll mode is used mainly as a map display mode is explained.

[0022] The processing flow chart of the position-coordinate display process in the case of self-vehicle position representation mode and a cursor location display mode is shown in drawing 3 . a) self-vehicle position representation Mohd -- explain self-vehicle position representation mode first.

[0023] First, when there is a key input of an input device 11, a system controller 5 acquires the inputted contents of a key concerned, and is the inputted data display mode key K1 concerned. Although it corresponds to the thing or self-vehicle position representation Mohd corresponding to a cursor location display mode, it distinguishes any they are (step S10). In addition, once this data display Mohd sets up, he shall hold the same Mohd until the next change is made.

[0024] In this case, since it is self-vehicle position representation Mohd, processing is shifted to step S11 and a self-vehicle location is calculated based on bearing data, angular-velocity data, mileage data, and GPS positioning data (step S11).

[0025] Next, the map around the display position concerned is drawn for the map data around the display position concerned on read-out (step S15) and display 17 screen from the CD-ROM disk DK as a display position [location / self-vehicle] centering on a display position, i.e., a self-vehicle location, (step S16).

[0026] Next, names, such as a self-vehicle location mark and main buildings, are overwritten at the core of the display screen (step S17), the LONG and the LAT of a self-vehicle location are further displayed on the lower part of the display screen (step S18), and processing is ended.

[0027] The display screen in the condition of having finished the above position-coordinate display processing is shown in drawing 4 . by the above processing, the self-vehicle location mark P (an arrowhead mark shows among drawing.) displays in the center of the map display screen -- having -- the lower part of a screen -- self-vehicle position coordinate PCAR it is -- LONG and the LAT are displayed. Self-vehicle position coordinate PCAR more current to a detail It turns out that they are the east longitude of 139 degrees, and the point of north latitude 36 degrees. This self-vehicle position coordinate PCAR It changes every moment as a self-vehicle moves. b) Explain a cursor location display mode, next a cursor location display mode.

[0028] First, when there is a key input of an input device 11, a system controller 5 acquires the inputted contents of a key concerned, and is the inputted data display mode key K1 concerned. Although it corresponds to the thing or self-vehicle position representation Mohd corresponding to a cursor location display mode, it distinguishes any they are (step S10).

[0029] In this case, since it is a cursor location display mode, processing is shifted to step S13, and they are four direction keys D1 - D4. The movement magnitude of the display position to depend is calculated (step S13), and it asks for a display position.

[0030] Next, the map around the display position concerned is drawn for the map data around the display

position concerned on read-out (step S15) and display 17 screen from the CD-ROM disk DK as a display position centering on the display position of the cursor for tab control specification, i.e., a cursor location, (step S16).

[0031] Next, names, such as the cursor C for tab control specification and main buildings, are overwritten at the core of the display screen (step S17), the LONG and the LAT of a cursor location are further displayed on the lower part of the display screen (step S18), and processing is ended.

[0032] The display screen in the condition of having finished the above position-coordinate display processing is shown in drawing 5 . by the above processing, the cursor C for tab control specification (the "+" mark shows among drawing.) displays in the center of the map display screen -- having -- the lower part of a screen -- cursor location coordinate PCSR it is -- LONG and the LAT are displayed. Cursor location coordinate PCSR more current to a detail It turns out that they are the east longitude of 139 degrees, and the point of north latitude 36 degrees. This cursor location coordinate PCSR The direction key D1 - D4 It changes by operating it. Specifically, it is the direction key D1. If it pushes once, a map display will move to the bottom by one step, and it is the direction key D2. If it pushes once A map display moves to left-hand side by one step, and it is the direction key D1. If it pushes once, a map display will move to the bottom by one step, and it is the direction key D1. If it pushes once, since a map display will move to right-hand side by one step The position coordinate of the current position changes as equivalent to the one step. c) Explain a mixed mode, then a mixed mode. In the following explanation, the case where the cursor C for tab control specification is displayed in the center of a screen is explained.

[0033] The processing flow chart of the position-coordinate display process at the time of a mixed mode is shown in drawing 6 . In the case of a mixed mode, since self-vehicle position representation Mohd and a cursor location display mode are combined, processing is shifted to step S11 and step S13 at coincidence juxtaposition.

[0034] First, a self-vehicle location is calculated based on bearing data, angular-velocity data, mileage data, and GPS positioning data (step S11). It can come, simultaneously they are four direction keys D1 - D4. The movement magnitude of the display position to depend is calculated (step S13), and it asks for a display position, and let the location of the cursor for tab control specification be a display position centering on a display position, i.e., a cursor location, (step S14).

[0035] Next, the map around the display position concerned is drawn for the map data around the display position concerned on read-out (step S15) and display 17 screen from the CD-ROM disk DK (step S16).

[0036] Next, the core of the display screen is overwritten and the cursor C for tab control specification is overwritten in predetermined locations, such as names, such as the self-vehicle location mark P and main buildings, (step S17). further -- cursor location coordinate PCSR of the cursor C for tab control specification And self-vehicle position coordinate PCAR it is -- LONG and the LAT are displayed on the lower part of the display screen (step S18), and processing is ended.

[0037] The display screen in the condition of having finished the above position-coordinate display processing is shown in drawing 7 . The cursor for tab control specification (the "+" mark shows among drawing.) is displayed in the center of the map display screen by the above processing. Self-vehicle location mark P (an arrowhead mark shows among drawing.) it displays on the location on the screen corresponding to the location which is carrying out current transit -- having -- the lower part of a screen -- cursor location coordinate PCSR of the cursor C for tab control specification it is -- LONG, the LAT, and self-vehicle position coordinate PCAR it is -- LONG and the LAT are displayed. Cursor location coordinate PCSR of the cursor C for tab control specification more current to a detail It is the east longitude of 139 degrees, and the point of north latitude 36 degrees, and is the current self-vehicle position coordinate PCAR of a self-vehicle. It turns out 1 minute and that north latitude 36 it is a point east longitude 139 degrees. This self-vehicle position coordinate PCAR It changes every moment as a self-vehicle moves.

[0038] Like the above explanation, according to this example, since the coordinate of the location of the arbitration on a display map screen can be displayed as numeric data, grasp of one display position is easy.

[0039] 2) The comparison of the location of a point-to-point is easy. 3) The comparison with other maps, such as a printed map, is easy. 4) Delivery of location data with other navigation equipment users etc. becomes easy.

[0040] 5) The destination data from other navigation equipment users etc. can be received numerically, and can be inputted. The effectiveness of ** can be acquired.

[0041] Although only the case where tab-control-specification cursor was displayed on middle of the screen

was described in the above example, it is indicated page scrolling mode by the map, and they are the direction key D1 - D4 about the cursor C for tab control specification. It is also possible to constitute so that it may use, it may move to the point of the arbitration on a screen and the position coordinate of the location concerned may be displayed.

[0042] Moreover, although only the case where a position coordinate was displayed was described in the above example, it is between [two or more] navigation equipment, and it also becomes it is possible and possible [using immediately the destination set up with a certain navigation equipment with all navigation equipments in this case] to constitute by radio etc., so that direct position-coordinate data may be exchanged.

[0043]

[Effect of the Invention] According to this invention, since a position coordinate (LAT and LONG) is numerically displayed on a map display, it becomes possible to transmit correctly against the destination, to grasp mutual relative physical relationship immediately, etc., and a deployment and common-use-izing of position-coordinate data can be attained also in an unfamiliar location.

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CLAIMS

[Claim(s)]
[Claim 1] The map display characterized by to have a tab-control-specification means specify the location of the arbitration on a display map, a coordinate operation means ask for the LAT and the LONG corresponding to the specified location, and a coordinate display means display the LAT and the LONG which were called for on said display map, in the map display which displays a map based on map data.
[Claim 2] The map display according to claim 1 characterized by displaying both the cursor which shows the location specified on said display map, said LAT, and LONG.
[Claim 3] The map display according to claim 1 or 2 characterized by said LAT and LONG which are equipped with a map scrolling means to scroll a map, and are displayed with scrolling of a map changing.
[Claim 4] Said map scrolling means is a map display according to claim 3 characterized by scrolling a map, displaying said cursor on the core of a map display.

[Translation done.]